

PATTERNS OF IT USE

Research and data on patterns of IT usage fall into two distinctly different groups: research conducted in the early to mid-1980s on the use of home computers, and research conducted in the mid-1990s on Internet use. There is thus a substantial gap in our understanding of how computers are used in the home. Not only do the empirical studies on PCs essentially reflect early adopters—a group of people who are known to be atypical of the general population—but they tend to be studies that, because of their research design, cannot be generalized to the overall population. And, as a study by the National Research Council (1997) points out, the software and user interfaces that we have today were designed for early typical uses. Jobs associated with these uses were held predominantly by white men. It has been suggested that this is intertwined with the many other psychocultural influences on adoption patterns. As a consequence, the findings for PC use should be regarded as *suggestive* (and certainly not as definitive)—they identify areas of potential research interest and analytical need.

This section of the report separates PC from Internet behaviors and addresses some distinctive differences by sex in the use of both computers and the Internet. No major works were identified that addressed (in detail) use and outcomes of different computing media, such as different software programs or the more recent CD-ROM resources.

HOME USE OF PERSONAL COMPUTERS

Early adopters of home computers did not necessarily use their machines intensively. For example, Riccobono (1985) found that in a typical week, a sizable proportion of adults (40 percent) did not use their computer at all. In general, many households found that they were using the PC less than they expected; in Riccobono's national study, 43 percent of the adult computer owners surveyed indicated that they used their computers much less than they anticipated at the time of purchase. This finding is consistent with other research addressed in Dutton, Rogers, and Jun (1987); two studies discussed in their literature review indicated that 18 and 27 percent of the respondents used their computer less than they had initially expected. Giacquinta, Bauer, and Levin (1993) found that 70 percent of the family members in their 1984–86 study were either non-intensive users or nonusers of their home computers.

Further, Venkatesh and Vitalari (1987) found that planned and actual use of home computers diverged. While the most frequently mentioned intended applications were for business and education, in reality, families tended to use their PCs more for word processing and games (which also reflects the availability of software at the time).¹⁵

Caron, Giroux, and Douzou (1989) reported in a longitudinal study of families with PCs that 18 percent had quit using their computer entirely after 2 years. Riccobono found that slightly over one-third of all age groups in his study used the computer 6 hours or more per week, a proportion comparable to that found for the children in the Giacquinta, Bauer, and Levin study but higher than they found for adults (only 25 percent were major users).¹⁶

These patterns of use were variable across family members, however. In the Riccobono study, only 16 to 20 percent of children aged 6–17 in the home did not use the computer at all in a typical week compared to 40 percent of the adults. While 45 percent of the parents were nonusers in the Giacquinta, Bauer, and Levin study, only 16 percent of the children were. Fathers tended to dominate use of the computer in the home (Caron, Giroux, and Douzou 1989; and Giacquinta, Bauer, and Levin 1993), and females tended to represent a higher proportion of nonusers across all age groups (Riccobono 1985; Giacquinta, Bauer, and Levin 1993).

Other factors also appear to influence frequency, intensity, and long-term computer use in the family. Dutton, Rogers, and Jun (1987) noted that computer users who become involved in a social (computing) network tended to use it for more hours each week and for a greater variety of applications. McQuarrie (1989) found that intensity and breadth of PC use was a function of the quality of the computing equipment in the household. Caron, Giroux, and Douzou (1989) reported that for families largely inexperienced with computers prior to purchase,

¹⁵For further analysis of computer use, see U.S. Census Bureau 1988 and 1989.

¹⁶Many factors could explain this difference in findings. To begin with, the Riccobono study was a national probability sample of several thousand households, and the amount of hours the computer was used per week was specifically quantified. The Giacquinta, Bauer, and Levin study, on the other hand, was a case study of 70 families, and “major use” of the computer was identified simply as frequent use for long periods of time.

sociodemographic variables were not good predictors of computing patterns in the home. Instead, families that had quit using their computer after 2 years had a naive approach to their computer purchase, high expectations for the technology, and tended to use the PC more for games and learning about the computer than other families. In contrast, families that sustained and even intensified their use of the PC over time had a much higher proportion of work-related use.

Evidence regarding the dominant content of PC use is mixed, and the research cannot be systematically summarized because of limited data, vastly different research designs, and different ways of presenting questions to survey respondents. The one theme that consistently emerges is the major role of education in PC use. The importance of educational uses of the computer tends to be referred to more often and in higher proportions by most studies than any other type of application (OECD 1998; and Dutton, Rogers, and Jun 1987). Other prominent uses appear to be games, word processing, and work-related tasks, as well as programming and learning about the computer (Riccobono 1985; Caron, Giroux, and Douzou 1989; OECD 1998; Dutton, Rogers, and Jun 1987; and Giacquinta, Bauer, and Levin 1993). The least frequently reported uses seem to be related to home operations.

HOME USE OF THE INTERNET

Evidence related to home uses of the Internet is far more recent and far richer than that related to computer use. This research also tended to use data from national probability samples and can therefore be used to make some generalizations to the overall population. However, these data suggest relatively limited Internet use from the home: only 2 percent of American households had Internet access in 1994, and estimates for 1998 placed this figure at 26 percent (figure 2).

Clemente (1998) reported that Americans accessed the Internet primarily from home: 75 percent of Internet users accessed it from home, and 46 percent did so exclusively in 1997. Clemente attributed this shift from work- to home-based use since 1994 largely to the changing rate structures of Internet service providers—e.g., the introduction of flat-rate monthly fees. Novak and Hoffman (1998) found that not having access to the Internet from home inhibited Internet use. People who have Internet access at work but not at home were less likely to have used the Internet in the previous 6

months than those having on-line access at home exclusively or at both home and office. People with no access to the Internet at home or in the office were not at all likely to have used the Internet in the previous 6 months except at higher income levels, suggesting that alternative public locations for use (e.g., libraries and schools) were not exploited by Americans without on-line access.

In 1997, Internet households tended to spend about 8 hours on-line per week; most (41 percent) accessed the Internet between 6 and 10 p.m. (Clemente 1998). Here too, patterns of use can vary widely by family members. For example, Kraut et al. (1996) reported that “the median teenage boy used the Internet at least once per week during 43 of the first 55 weeks [of the HomeNet field trial] and logged 320 hours of connect time. The median adult male accessed the Internet only 20 out of the 55 weeks and logged less than 32 hours of connect time.” For 85 percent of the families in this study, the heaviest Internet user was a child.

The HomeNet study is an interesting one because of its research design. It is not a probability sample so it cannot be generalized to the U.S. population, but it is relatively unique in using time diaries and actual electronic computer logs to study how people spend time on the Internet. In addition, traditional socioeconomic barriers to household access to PCs and the Internet are removed by virtue of the study’s design: families were given a subsidized home computer, free Internet service, and training on computer and Internet use. After extensive statistical analysis, Kraut et al. (1996) concluded that “Neither household income nor education predicted Internet use, strongly suggesting that if economic barriers were removed, people across socioeconomic lines would use the Internet.”

The authors did find, however, that race, sex, and generational differences were all strong predictors of Internet use: teen males were heavier users than teen females, whites were likely to use the Internet more than minorities, men more than women, and teens more than adults. The single strongest predictor of Internet use was the generational variable—teens versus adults. Kraut et al. found that after controlling for these demographic factors, all other potential influences on Internet behavior became statistically insignificant. They analyzed the impact of psychological states (depression, social extroversion, and innovativeness); the amount of “hassles” people experienced on a day-to-day basis;

computing experience and attitudes; and the use of traditional media. In related HomeNet research, Kraut, Mukhopadhyay et al. (1998) found that individuals who rate themselves as having strong computer skills are the heaviest users of the Internet.

E-mail and World Wide Web activity dominate home Internet use; in general, it appears that e-mail may be the more important activity. In their study of HomeNet families, Kraut, Mukhopadhyay et al. (1998) found from computer logs that people used e-mail more frequently than the Web and that they used e-mail first in on-line sessions that included both e-mail and Web activity. Indeed, people who used e-mail more than the Web were more likely to continue using the Internet over the course of a year than people making greater use of the Web.

How people use the Web is both idiosyncratic and generalizable. For example, Kraut et al. (1996) found that the websites visited by HomeNet family members were unique to the individual. Of the roughly 10,000 unique addresses visited during the study, 55 percent were accessed by only one person, and fewer than 2 percent were visited by 20 percent or more of the individuals in the sample (these tended to be search engines and Web portals).

Usage is nonetheless patterned by broad categories. In terms of general information searches, the American Internet User Survey reveals that health and medicine is the most popular Internet subject. Thirty-six percent of all users and 47 percent of women reported exploring this subject; other major areas of interest included entertainment, music, parenting/children, and lifestyles subjects.¹⁷ NTIA (1999) found distinctive patterns of home Internet use based on purpose. In general, individuals with higher income and education levels were far more likely to use the Internet for work-related activities, while minorities and unemployed individuals used the Internet for employment searches and to take educational courses. Clemente (1998) found an increase in on-line purchasing—about 27 percent of 1997 Internet users made on-line purchases the previous year, compared to 19 percent at the end of 1995. Clemente also cited the following patterns in the kinds of information sought by Internet users:

- As age increases, so does interest in Internet information related to news, travel,

government/community, health and medicine, product information, and personal investing.

- Women tend to seek information related to travel, health and medicine, food, and parenting more than men.
- High-income individuals are peak users of travel, product information, sports, and investment information.
- Low-income individuals are peak users of hobby, community, music, game, adult education, and parenting information. NTIA (1995) found that low-income households were more likely to use the Internet for employment purposes, education, and accessing government reports than other households.

Katz and Aspden (1997) conducted one of the few studies that addressed Internet use related to social integration. In a random digit dial survey of 2,500 respondents, these authors found that after controlling for demographic differences between groups (age, sex, education, race, and income), there were no statistically significant differences in the degree to which Internet users were members of religious, leisure, or community organizations compared to nonusers. In addition, the authors found that the vast majority of Internet users (both recent and long term) reported no change in the amount of time spent with family and friends on the phone or through face-to-face contact. Interestingly, the data indicate that long-term Internet users belong to more community organizations than any other group (nonusers, former users, etc.), suggesting that there may be people who are simply more “connection oriented” than others.

Hill and Hughes (1998) explored social integration by focusing on individuals they call “Internet activists.” Using data from the Pew Research Center for the People and the Press, Hill and Hughes examined individuals who reported that they either “chatted” about politics on the Internet or posted political messages to newsgroups, bulletin boards, and so forth. About 18 percent of Internet users in 1995–96 could be considered Internet activists, and the authors found statistically significant differences between this group of people, the general public, and Internet users who did not use the Internet for political activity. Hill and Hughes found that Internet activists were generally younger than the other two groups and also substantially tended to be male and better educated.

¹⁷Data from the American Internet User Survey, accessed August 19, 1999, Cyber Dialogue <www.cyberdialogie.com/free_data/index.html>.

Internet activists were also less likely to be white than the general public and other Internet users, an unusual result given the predominant demographics of Internet users. Internet activists also identified less with the Republican party than the general public and were more tolerant with respect to certain civil liberties. (They were less likely to oppose book burning, homosexuality, or pornography.) They were no different than the general public, however, with respect to such issues as assisting the needy, attitudes toward regulating business, or the strength of their political party identification.

GENDER DIFFERENCES

One of the most persistent differences in computer and Internet use relates to gender. Several studies point to the dominance of men in household decision-making about home computer purchases (Caron, Giroux, and Douzou 1989; Giacquinta, Bauer, and Levin 1993; and Vitalari, Venkatesh, and Gronhaug 1985), and the extensive case research conducted by Giacquinta, Bauer, and Levin highlighted the limited role of women in household computing dynamics. Mothers in this study were not only far less likely to be major users of the home computer compared to the fathers (9 percent versus 43 percent, respectively), but when women *were* major users, their husbands and sons still viewed them as inferior and unskilled with respect to the PC.

Both the Caron, Giroux, and Douzou research and Giacquinta, Bauer, and Levin study suggest that computer use by fathers displaced access by other family members. In both studies, survey data and field logs indicated that the home computer was located or used in a way that prevented other family members, particularly wives and daughters, access to the machines. In the Caron, Giroux, and Douzou study, when a second PC was brought into the home, the amount of time spent on the computer by mothers and children was appreciably higher than in households with only one machine. In his study of educational uses of the home computer, Riccobono (1985) also finds “clearcut sex differences” in every age group. Males were substantially more likely to use a computer and to use it for more hours than women; 55 percent of adult women reported not using the computer at all in a typical week, compared to 27 percent of men.

The tendency for men to use on-line services more often and for longer periods was identified by Clemente (1998); by Kraut et al. (1996); by Kraut, Mukhopadhyay et al. (1998); and by Bruce (1988) in her analysis of

teletext services in the early 1980s. Clemente also found differences between the sexes in the types of Internet content accessed. In a qualitative discussion about what women appeared to want from on-line services, Clemente concluded that, at least in the mid-1990s, the Internet simply did not have what women wanted and needed.¹⁸ Giacquinta, Bauer, and Levin concluded much the same for the limited participation of women in early home computing: “Clearly for the majority of these women, the design, marketing, and interpretation of home computer hardware and software did not address their needs or the reality of their lives. Mothers view time in the home very differently, time required to master computer activities is a burden rather than an escape or pastime” (1993, p. 90).

EDUCATIONAL USE OF COMPUTERS

The one use of home computers most consistently and strongly detected in the empirical research relates to the importance of home computing for educational purposes. Two studies, both more than 10 years old, examined the use of home computers for education and informal learning. Riccobono (1986) reported the results of the Home Information Technology Survey (HITS), a national random digit dial survey fielded in early 1985 on the availability of personal computers in the home and their use for educational purposes. Giacquinta, Bauer, and Levin (1993) reported the results of a qualitative study of 70 families from 1984–86 related to how children used computers at home.

Conducted by the Department of Education, HITS was designed to provide a national picture of out-of-school (informal) learning activities by Americans and the types of learning resources they used. Riccobono (1986) summarized the HITS findings and addressed the availability of IT in the home and its use for education and learning. IT was broadly defined and included print, audio, video, and computer technologies; learning was differentiated as practical/recreational (hobby-related, for example) and intellectual (acquiring skills and knowledge for their own sake). Survey questions distinguished behaviors of household members by age: children 2–5 years old, children 6–11 years; children 12–17 years, and adults (18 years and older). The data were adjusted and weighted to be statistically representative of the U.S. population.¹⁹

¹⁸See particularly his discussion on pp. 57–60.

¹⁹Findings cannot be generalized to elderly or low-income populations, however, because of bias in the random digit dial method used for this study.

Riccobono reported several findings related to PC use for educational purposes:

- When computers were available,²⁰ they were more likely to be used for learning by children than by adults.
- Computers were almost three times more likely to be used for intellectual rather than recreational learning for all age groups.
- Seventy-two percent of adult respondents indicated that computer games and programs were “not helpful” to their learning activities; just over half of the children aged 6–17 indicated the same lack of helpfulness.
- Individuals who preferred to study alone or at their own pace were slightly more likely to use computers for learning compared to those who liked to study in a group or in a more structured environment.

Conducted over the same time period (1984–86), Giacquinta, Bauer, and Levin’s study was essentially a collection of 70 case studies on home computing. White middle and upper class households from the New York City tri-state area were studied for 4 months; fieldworkers made 6–10 visits to a family of 1–3 hours per visit and recorded data in a field log. The logs were

then subjected to content analysis. The authors reported a “near absence” of children’s academic computing—that is, computing for the purpose of learning school subjects and critical thinking. Game playing consumed most of the children’s time on the computer. Interestingly, the authors found that children (or their families) were discouraged from using or talking about their computers because of negative social pressures from teachers or neighbors. Overall, they found a complex set of interrelated factors that influence a child’s academic computing efforts at home, including school emphasis, parental support, availability of academic software at home, early computing experiences, and peer and sibling support.

More recent data on children’s use of computers tends to reinforce the findings from these older studies. The National Center for Education Statistics reported that, at least for fourth and eighth graders, playing games was the most common computing activity (NCES 1998). Nearly 90 percent of all children in these grades used their computer at home (or at school)²¹ for this reason. However, 80 percent or more of students also reported using the computer “to learn things,” and 96 percent of 11th graders used the computer to write stories or papers (these data are from 1996). The overall impression from the data is that at the grade levels surveyed, students used the computer to play, learn, and write in overwhelming proportions and that no one application dominated computer use.²²

²⁰As a reminder, this study found that 13 percent of all adults in U.S. households had access to a home computer, as did about 20 percent of children aged 6–17. Riccobono cautions that the influence of technology should consequently not be overstated for out-of-school learning. Not only did he find that “substantial numbers of learners within each age group made no use of any technology in their learning,” but “adults who use no technology were likely to be more satisfied with their learning than adults who used some form of technology” (Riccobono 1986, p. 11).

²¹Note that the NCES data do not differentiate between student use of the computer at home or school.

²²For more current studies that were not available at the time this report was prepared, see NCES (1999a, 1999b, 2000).

